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Drinking Water Surveillance Program

CORNWALL WATER TREATMENT PLANT

Annual Report 1987

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**CORNWALL
WATER TREATMENT PLANT**

**DRINKING WATER SURVEILLANCE
PROGRAM**

ANNUAL REPORT 1987

**ONTARIO MINISTRY OF ENVIRONMENT
OCTOBER 1988**

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ACKNOWLEDGEMENTS

The Drinking Water Surveillance Program (DWSP) employs a team approach requiring the co-operative effort of the Ministry of the Environment (MOE) staff from Water Resources and Laboratory Services Branch and the Regions, as well as plant operational staff from the Municipalities.

This annual report was produced by the DWSP Group (Ron Hunsinger, Peter Bohm, Carol Sackville-Duyvelshoff, Chris Fung and John McGrachan) and by Pat Lachmaniuk (on developmental assignment to the Drinking Water Section). Helpful input and reviews were received from Drinking Water Section Staff, in addition to reviews by other MOE and municipal personnel.

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL WATER TREATMENT PLANT 1987 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored.

The Cornwall Water Treatment Plant is a conventional treatment plant which treats water from Lake St. Lawrence. The process consists of coagulation, flocculation and sedimentation, filtration, disinfection and fluoridation. A coagulant was not used during September, October, November and December. This plant serves a population of approximately 46,000 people and has a design capacity of 100 x 1000m³/day.

Water samples from two distribution system sites were taken on a monthly basis and analyzed for approximately 160 parameters, 10 times during 1987. Sampling of the raw and treated water at the plant was initiated in September and sampled on a monthly basis. Parameters were divided into the following groups: Bacteriological, Inorganic and Physical (Laboratory Chemistry, Field Chemistry and Metals) and Organics (Chloroaromatics, Chlorophenols, Pesticide and PCB, Phenolics, Polynuclear Aromatic Hydrocarbons, Specific Pesticides and Volatiles). Specific Pesticides and Chlorophenols were analysed in June and November only.

A summary of results is shown in Table 1.

Fecal Coliforms were present in the December distribution system Site 2 free flow sample. The District Officer was notified. Due to its sampling frequency of once per month, the DWSP is not designed to evaluate all aspects of the bacteriological quality of the water; however routine bacteriological monitoring as outlined in the Ontario Drinking Water Objectives (ODWO) is carried out by the operating authority. In terms of the limited DWSP bacteriological examination the water was of generally good quality.

Inorganic and Physical parameters (Laboratory Chemistry, Field Chemistry and Metals) were below applicable health related ODWOs.

Of approximately 110 Organic parameters tested for on a monthly basis, none exceeded health related guidelines.

Many of the substances detected are naturally occurring or treatment by-products.

During 1987 the limited DWSP sampling results indicated that the Cornwall Water Treatment Plant produced good quality water at the plant and this quality was maintained throughout the distribution system.

SOMMAIRE

PROGRAMME DE SURVEILLANCE DE L'EAU POTABLE

STATION D'ÉPURATION DE L'EAU DE CORNWALL RAPPORT ANNUEL 1987

Le Programme de surveillance de l'eau potable (PSEP) de l'Ontario fournit des informations immédiates, fiables et à jour sur la qualité de l'eau potable. Le PSEP a débuté officiellement en avril 1986. Il est destiné à englober tous les réseaux municipaux d'alimentation en eau de l'Ontario. Actuellement, 44 stations en font partie.

La station d'épuration de Cornwall est une station classique qui traite l'eau du lac Saint-Laurent. Le traitement comporte la coagulation, la floculation, la décantation, la filtration, la désinfection et la fluoration. En septembre, octobre, novembre et décembre, on n'a pas utilisé de coagulant. La station dessert une population d'environ 46 000 habitants et a une capacité nominale de 100 x 1 000 m³/jour.

Des prélèvements ont été effectués chaque mois en deux points du réseau de distribution; 10 fois en 1987, ils ont été analysés par rapport à environ 160 paramètres. Des prélèvements mensuels d'eau brute et d'eau traitée à la station ont commencé en septembre. Les paramètres mesurés appartenaient aux catégories suivantes : bactériologique, inorganique et physique (analyses en laboratoire et sur place, présence de métaux) et organique (composés aromatiques chlorés, chlorophénols, pesticides et BPC, dérivés phénoliques, hydrocarbures aromatiques polynucléaires, pesticides particuliers et composés volatils). Les pesticides particuliers et les chlorophénols n'ont été analysés qu'en juin et en novembre.

Le tableau 1 résume les résultats obtenus.

En décembre, des coliformes ont été relevés dans l'échantillon du site 2 du réseau de distribution et l'agent de district en a été avisé. En raison de la fréquence des prélèvements (un par mois), le PSEP ne permet pas d'évaluer tous les aspects de la qualité bactériologique de l'eau. Cependant, comme on le recommande dans le cadre des objectifs relatifs à la qualité de l'eau potable en Ontario, un contrôle bactériologique systématique est effectué par l'exploitant. L'analyse bactériologique limitée du PSEP a révélé une eau de bonne qualité.

Les mesures des paramètres inorganiques et physiques (analyses en laboratoire et sur place, présence de métaux) étaient inférieures aux limites applicables fixées par l'Ontario pour l'eau potable.

Pour environ 110 paramètres organiques mesurés chaque mois, aucun résultat n'a dépassé les limites acceptables fixées pour la santé.

Un grand nombre de substances détectées apparaissent naturellement ou sont des produits dérivés de l'épuration.

Les résultats des analyses effectuées en 1987 dans le cadre du PSEP ont indiqué que la station d'épuration de Cornwall donnait une eau de bonne qualité et que cette qualité se maintenait dans tout le réseau de distribution.

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE BY SCAN (1987)

SCAN	RAW			TREATED			SITE 1			SITE 2		
	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	16	16	100	16	3	18	33	9	27	42	18	42
CHEMISTRY (FLD)	12	12	100	24	24	100	89	89	100	81	81	100
CHEMISTRY (LAB)	76	64	84	76	59	77	297	256	86	297	248	83
METALS	80	40	50	80	39	48	351	186	52	351	194	55
CHLOROAROMATICS	52	0	0	52	0	0	91	0	0	91	0	0
CHLOROPHENOLS	6	0	0	6	0	0	.	.	.	.	.	.
PAH	51	0	0	51	0	0	.	.	.	.	.	.
PESTICIDES & PCB	100	0	0	100	0	0	179	0	0	179	0	0
PHENOLICS	4	0	0	4	0	0	.	.	.	.	.	.
SPECIFIC PESTICIDES	63	0	0	63	0	0	72	0	0	72	0	0
VOLATILES	112	1	0	112	17	15	251	36	14	251	38	15
TOTAL	572	133		584	142		1363	576		1364	579	

FECAL COLIFORMS WERE PRESENT IN ONE DISTRIBUTION WATER. NO OTHER HEALTH RELATED GUIDELINES/LIMITS WERE EXCEEDED

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
 A '.' INDICATES THAT NO SAMPLE WAS TAKEN

DRINKING WATER SURVEILLANCE PROGRAM

CORNWALL WATER TREATMENT PLANT 1987 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored. Appendix A contains a detailed description of the DWSP.

The DWSP was initiated at the Cornwall Water Treatment Plant in February, 1987 with the two distribution sites and in September for the plant.

This report contains information and results for 1987.

PLANT DESCRIPTION

The Cornwall Water Treatment Plant is a conventional treatment plant which treats water from Lake St. Lawrence. The process consists of coagulation, flocculation, sedimentation, filtration, disinfection and fluoridation. Coagulation, flocculation and sedimentation were not used for four months during 1987. This

plant serves a population of approximately 46,000 people. It has a rated capacity of 100 x 1000m³/day and daily flows ranging from 14 x 1000m³/day to 92 1000m³/day.

The plant location is shown in Figure 1. Plant process details, in a block schematic, are shown in Figure 2. General plant information is presented in Table 2.

METHODS

Water samples were obtained from four DWSP approved locations;

- i) Plant Raw - The water originated from the intake pipe prior to chlorination and was sampled through a stainless steel sample line. The sample tap is located in the screen house.
- ii) Plant Treated - The water originated at the treated suction well after addition of all treatment chemicals and was sampled through a stainless steel sample line. The sample tap is located in the plant's laboratory.
- iii) Distribution System - Site 1 - This house is approximately 5 kilometers from the plant. Water was sampled through copper plumbing from the basement laundry tap.
- iv) Distribution System - Site 2 - This house is approximately 6 kilometers from the

FIGURE 1

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

SITE LOCATION MAP

LOCATION: CORNWALL WATER TREATMENT PLANT



Figure 2
CORNWALL WATER TREATMENT PLANT

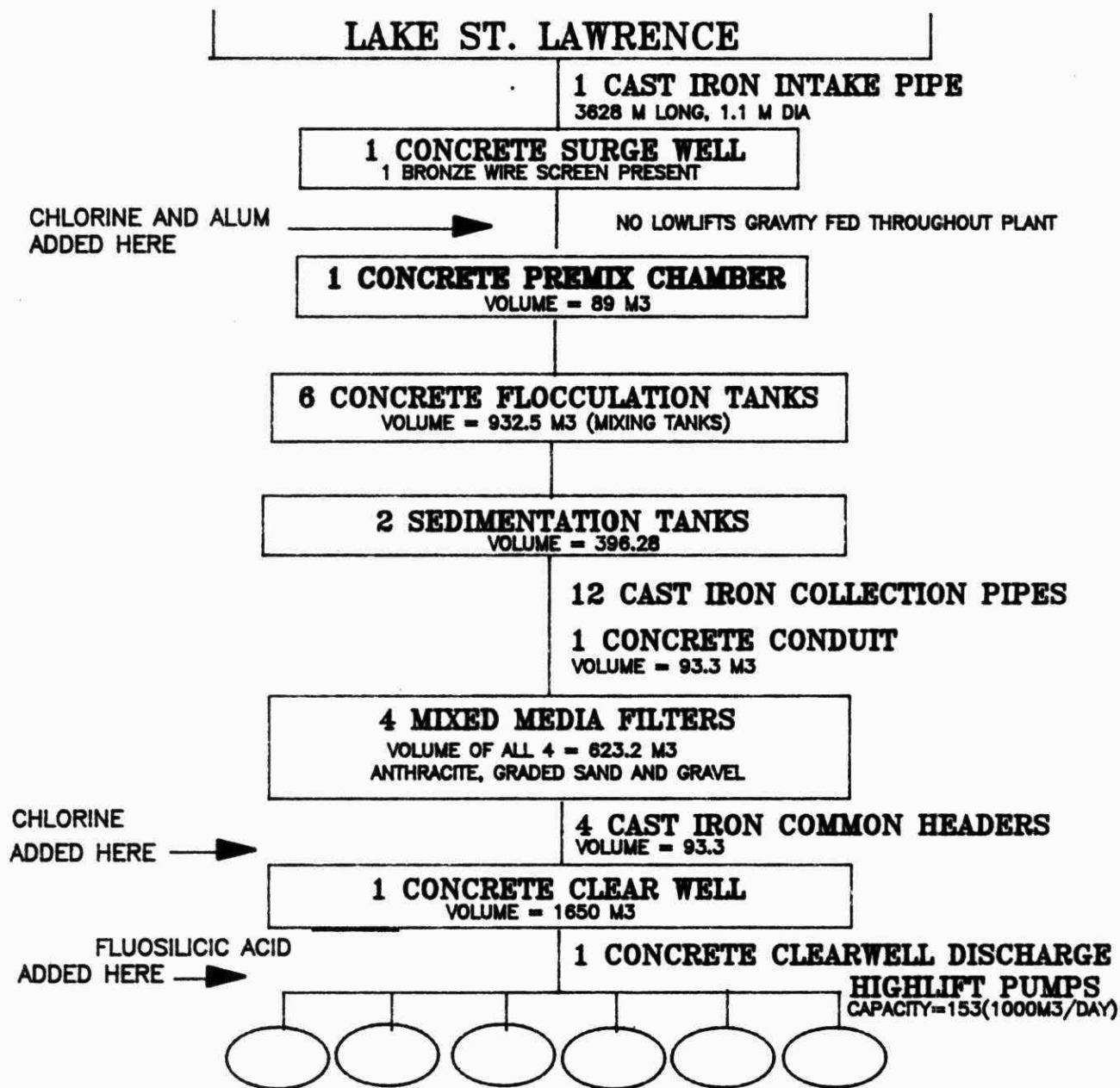


TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

GENERAL INFORMATION

CORNWALL WATER TREATMENT PLANT

LOCATION: 861 SECOND STREET WEST
CORNWALL, ONTARIO
(613-932-2235)

SOURCE: RAW WATER SOURCE - LAKE ST. LAWRENCE

RATED CAPACITY: 100 (1000 M3/DAY)

OPERATION: MUNICIPAL

PLANT SUPERINTENDENT: MR C. HEDLEY

MINISTRY REGION: SOUTHEASTERN

DISTRICT OFFICER: MR G.J. MCKENNA

<u>MUNICIPALITY SERVED</u>	<u>POPULATION</u>
CORNWALL	45,980

plant. Water was sampled through copper plumbing from the basement laundry tap.

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At both distribution system locations two types of samples were obtained: a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples are used to make an assessment of the amount by which levels of inorganic compounds and metals may be changed on standing due to leaching from (or deposition on), the plumbing system. The only analyses carried out on these samples therefore, are General Chemistry and Metals. The free flow sample represented fresh water from the distribution main that had been flowing for five minutes before being sampled.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water between the two sampling points by the sample day flow. For example, if it was determined that the retention time within the plant was five hours then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water travel from the plant to the distribution system site, this site would

be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to eliminate any variance (Appendix B).

Sample day flows, treatment chemical dosages and Field Chemistry measurements were recorded on the day of sampling and were entered onto the DWSP data base as submitted.

RESULTS

Two sites within the Cornwall distribution system were sampled 10 times during 1987. Sampling at the water treatment plant was initiated in September 1987 when installation of stainless steel sample lines was completed. Specific Pesticides and Chlorophenols were only analysed for in November. Polynuclear Aromatic Hydrocarbons and Phenolics are only analysed for in the raw and treated water at the plant.

Table 3 contains information on the sample day retention time, flow rate and treatment chemicals used and their associated dosages.

Table 4 is a summary break-down of the number of water samples analysed for by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical

limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 presents parameters not detected.

Associated guidelines and detection limits are also supplied on both tables. Parameters are listed alphabetically within each scan.

DISCUSSION

General

Water quality is judged by comparison with the Ontario Drinking Water Objectives (ODWOs) as defined in the 1984 publication (ISBN 0-7743-8985-0). The Province of Ontario has health related and aesthetic objectives for 49 parameters, these are currently under review. When an ODWO is not available guidelines/limits from other agencies are consulted. The Parameters Listing System (PALIS) recently initiated by the MOE catalogues and keeps current over 1750 guidelines for 650 parameters from agencies throughout the world.

As stated under Results, traces do not indicate quantifiable results as defined by established MOE laboratory analytical reporting protocols. While they can be useful in trend analysis or confirmation of the presence of a specific contaminant that is repeatedly detected at these levels, the occasional finding of a trace level of a contaminant is not considered to be significant. DISCUSSION OF GUIDELINES AND LIMITS THEREFORE, IS ONLY CONDUCTED ON POSITIVE RESULTS.

Bacteriology

Positive results for the Bacteriology scan were present three times in the treated water, nine times in the distribution system Site 1 water and eighteen times in the Site 2 water. In almost all cases the positive parameters were Standard Plate Count and/or Total Coliform Background.

The presence/absence (P.A.) test determined Fecal Coliforms to be present within 48 hours in the December sample from the distribution Site 2. The District Officer was notified. Fecal coliforms were not detected in any other sample from any location.

Standard Plate Count is a test used to supplement routine analysis for Coliform bacteria. The limit for Standard Plate Count (at 35°C, after 48 hours) in the ODWOs is 500 organisms per

mL based on a geometric mean of 5 or more samples. High Standard Plate Counts were present in one sample from distribution system Site 1 and four samples from Site 2. This may be indicative of deterioration in conditions in the distribution system. A Total Chlorine Residual of at least 0.100 mg/L was detected at both sampling locations in the distribution system however, water temperature became elevated during the summer months. The high Standard Plate Counts obtained for the months of July, August, September and October probably reflect increased bacteriological growth as a result of this.

Due to its sampling frequency of once per month, the DWSP is not designed to evaluate all aspects of the bacteriological quality of water. However the finding of Fecal Coliforms and Total Coliforms in the December sample from distribution system Site 2 as well as the elevated Standard Plate Counts found at this location in the summer months appears to warrant close monitoring. Routine bacteriological monitoring, as outlined in the ODWOs is carried out by the operating authority. Water from the Cornwall Water Treatment Plant, in terms of the limited DWSP bacteriological examination, was of good quality.

Inorganic and Physical Parameters

Laboratory and Field Chemistry

The results for the Laboratory Chemistry and Field Chemistry scans were below applicable health related ODWOs.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of Turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO of 1 Formazin Turbidity Unit (FTU) is only applicable to treated water leaving the plant.

The June and September standing samples and June free flow samples for both distribution system sites contained high Field Turbidities. Total Chlorine Residual measurements indicate that the elevated Turbidity in the June and September samples did not appear to affect the maintenance of the chlorine residual. A high Standard Plate Count was present in the September sample only, which could have been a result of the high Turbidity present along with the elevated temperature of the treated water.

Laboratory Turbidity values did not confirm the high Field Turbidity values. The reasons for discrepancies between Field and Laboratory Turbidities, which have also been observed at other water supplies on DWSP, are being investigated.

There are ODWOs that are set for parameters which are related to aesthetic quality rather than health. One of these is Organic Nitrogen. Organic Nitrogen is calculated by subtracting the Ammonia (Ammonium Total) value from the Total Kjeldahl Nitrogen (Nitrogen Tot Kjeld) value. In a number of the treated water samples and distribution system Site 1 and 2 samples Organic

Nitrogen values exceeded the aesthetic ODWO of 0.15 mg/L. When Organic Nitrogen exceeds 0.15 mg/L in treated water some taste and odour problems can result.

This guideline is exceeded in most supplies. Based on the information obtained from the DWSP, which generally indicates no problems with this parameter exceedence, the guideline may be modified when the ODWOs are reviewed.

Colour values exceeded the aesthetic ODWO of 5 True Colour Units (TCU) in one standing and free flow sample from distribution system Site 1. Colour in drinking water may be due to the presence of natural or synthetic organic substances as well as certain metallic ions.

It is desirable that the Temperature of drinking water be less than 15°C; the palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The desired ODWO was exceeded nine times in the distributed water.

As part of the treatment plant process, fluosilic acid is added to the treated water (Table 3). Where fluoridation is practiced, the Fluoride concentration recommended in the ODWO is 1.2 mg/L, plus or minus 0.2 mg/L. Maintenance of this level can generally be observed. Fluoridation was not evident in May and July as indicated by the low levels of fluoride. Table 3 indicates that

fluosilic acid was added in May but the low May Fluoride levels do not support this.

Metals

The results reported for the Metals scan were below any applicable health related ODWOs.

Elevated levels of Iron, Copper, Manganese and Zinc were detected in the distribution system samples as compared to the raw water indicating that small quantities of these metals were leached from the distribution system mains as the water travelled to each house.

Elevated levels of Copper, Zinc and marginally elevated Lead levels were detected in the standing samples as compared to the free flow distribution samples thus, indicating that small quantities of these metals were leached from the household plumbing as the water stood overnight.

Mercury levels in the free flow samples from distribution system Site 2 were erratic. Over the past year in the DWSP it has been observed that potassium dichromate, used to preserve Mercury samples, has a limited shelf-life and may show false positives for the presence of Mercury. As the preservative deteriorates, Mercury levels increase due to interferences and are replaced.

At present, there is no evidence that Aluminum is physiologically harmful and no health limit has been specified. The measure of

residual Aluminum in the treated water is important to indicate efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 0.1 mg/L as Al in the water leaving the plant. Aluminum values exceeded the ODWO operational guideline three times in the treated water.

Organic Parameters

Chloroaromatics

The results of the Chloroaromatics scan showed that one parameter was detected:

Hexachloroethane

Hexachloroethane was detected at trace levels once in the distribution system Site 1 water and three times in the Site 2 water.

Review of these results, along with information from other water supplies on DWSP, would indicate that certain chloroaromatics appear more frequently in the treated water than in the raw and almost always only at trace levels. These occurrences could possibly be due to a reaction of chlorine with organics present in the water or in the distribution system.

Chlorophenols

The results of the Chlorophenols scan showed that no parameters were detected.

Pesticides and PCB (Polychlorinated Biphenyl)

The results of the Pesticides and PCB scan showed that three pesticides were detected:

Alpha BHC

Lindane

PPDDT

Lindane consists of several isomers of BHC (Benzene Hexachloride). Alpha BHC is the predominant isomer found in water from the Great Lakes Basin as indicated in results from other water supplies on DWSP.

Alpha BHC was detected at trace levels, three times in the raw water, three times in the treated water, six times in the distribution system Site 1 water and four times in the Site 2 water.

Lindane was detected at trace levels once in the distribution system Site 1 water and twice in the Site 2 water.

PPDDT was detected once at a trace level, in the distribution system Site 2 water.

Specific Pesticides

Results of the Specific Pesticides scan showed that no parameters were detected.

Phenolics

Results of the Phenolics scan showed that no parameters were detected.

Polynuclear Aromatic Hydrocarbons (PAH)

Results of the PAH scan showed that no PAHs were detected.

Volatiles

The results of the Volatiles scan showed that four parameters, other than Trihalomethanes (THMs), were detected:

Benzene

Toluene

Ethylbenzene

Tetrachloroethylene

Benzene was detected at a trace level, once in the distribution system Site 1 water.

Toluene was detected at trace levels, once in the raw water, twice in the treated water, three times in the distribution system Site 1 water and once in the Site 2 water. For both the October treated water and distribution system Site 2 water positive results, contamination was suspected as indicated by the 'UCS' remark code. The distribution system Site 2 September sample contained a positive value of 0.55 ug/L. This is below the California State Department of Health Drinking Water Action Level of 100 ug/L. Subsequent to the printing of Table 5, Health and Welfare Canada have published an Aesthetic Objective (AO) for

Toluene in drinking water of 24 ug/L. This objective was set based on taste impairment, but only after a review of toxicological data indicated it to be below the level considered to constitute a health hazard.

Ethylbenzene was detected at trace levels, once in the raw water, twice in the treated water, four times in the distribution Site 1 water and three times in the Site 2 water.

These volatiles are typically found on an occasional basis at other water supplies included on the DWSP usually at trace levels.

Tetrachloroethylene was detected at a trace level, once in the distribution system Site 2 water.

Trihalomethanes (THMs) are known to be produced during the water treatment process and will always only occur in chlorinated surface waters. THMs are comprised mainly of Chloroform, Chlorodibromomethane and Dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs.

Chloroform, Chlorodibromomethane, Dichlorobromomethane and total THMs were always detected in all treated waters. Bromoform was detected at trace levels three times in the treated, distribution system Site 1 and Site 2 water. All THM occurrences were well

below the ODWO of 350 ug/L for Total THMs.

THMs were detected in one raw water sample at a trace level, indicating the presence of small amounts of chlorine.

CONCLUSIONS

The Cornwall Water Treatment Plant for the sample year of 1987 produced good quality water that was maintained throughout the distribution system.

No health related guidelines, for organic or inorganic parameters were exceeded during 1987.

RECOMMENDATIONS

Two recommendations can be made and are as follows;

- 1) The data base should be reviewed in consultation with Regional, Plant and DWSP personnel to determine if sampling location, sampling frequency and the number of parameters analysed could be revised to allow for a more efficient characterization of the water.

- 2) The application of treatment chemicals such as alum should be continuous.

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SAMPLE DAY CONDITIONS			TREATMENT CHEMICAL DOSAGES (MG/L)			
DATE	RETENTION TIME(HRS)	FLOW (1000 M3)	PRE-CHLORINATION	COAGULATION	FLUORIDATION	POST-CHLORINATION
			CHLORINE	ALUM LIQUID	FLUOSILIC ACID	CHLORINE
APR 02	.0	.0	.10	10.87	.90	.30
MAY 20	.0	46.0	.10	11.99	1.00	.30
JUN 16	4.1	38.0	.10	16.77	.80	.30
JUL 21	5.6	38.5	.10	13.43	.	.30
AUG 18	6.0	36.3	.10	5.00	1.00	.30
SEP 22	3.5	61.2	.10	*	1.00	.30
OCT 19	3.7	57.5	.20	*	1.00	.30
NOV 17	6.0	36.3	.10	*	1.00	.30
DEC 16	6.4	33.9	.10	*	1.00	.30

* No alum addition

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW			TREATED			SITE 1			SITE 2		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL	AEROMONAS SP	.	.	.	.	.	.	.	.	.	2	0	0
	COLIFORM	.	.	.	.	.	.	.	.	.	2	1	0
	ESCHERICHIA COLI BY PRESENCE/ABSENCE	.	.	.	.	.	.	.	.	.	2	0	0
	FECAL COLIFORM	.	.	.	.	.	.	.	.	.	2	1	0
	FECAL COLIFORM MEMBRANE FILTRATION	4	4	0	.	.	.	.	.	.	.	.	.
	P/A BOTTLE	.	.	.	4	0	0	9	0	0	9	2	0
	STANDARD PLATE COUNT MEMBRANE FILT.	4	4	0	4	3	0	6	6	0	7	7	0
	STAPH AUREUS	.	.	.	.	.	.	.	.	.	2	0	0
	TOTAL COLIFORM BACKGROUND MF	4	4	0	4	0	0	9	2	0	8	6	0
	TOTAL COLIFORM MEMBRANE FILTRATION	4	4	0	4	0	0	9	1	0	8	1	0
*TOTAL SCAN BACTERIOLOGICAL		16	16	0	16	3	0	33	9	0	42	18	0
*TOTAL GROUP BACTERIOLOGICAL		16	16	0	16	3	0	33	9	0	42	18	0
CHEMISTRY (FLD)	FIELD COMBINED CHLORINE RESIDUAL	.	.	.	4	4	0	13	13	0	2	2	0
	FIELD FREE CHLORINE RESIDUAL	.	.	.	4	4	0	7	7	0	12	12	0
	FIELD PH	4	4	0	4	4	0	18	18	0	17	17	0
	FIELD TEMPERATURE	4	4	0	4	4	0	18	18	0	17	17	0
	FIELD TOTAL CHLORINE RESIDUAL	.	.	.	4	4	0	17	17	0	17	17	0
	FIELD TURBIDITY	4	4	0	4	4	0	16	16	0	16	16	0
	*TOTAL SCAN CHEMISTRY (FLD)	12	12	0	24	24	0	89	89	0	81	81	0
CHEMISTRY (LAB)	ALKALINITY	4	4	0	4	4	0	18	18	0	18	18	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	SITE											
		RAW			TREATED			SITE 1			SITE 2		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHEMISTRY (LAB)	AMMONIUM TOTAL	4	2	2	4	1	1	18	13	3	18	6	8
	CALCIUM	4	4	0	4	4	0	18	18	0	18	18	0
	CHLORIDE	4	4	0	4	4	0	18	18	0	18	18	0
	COLOUR	4	2	2	4	0	4	18	9	9	18	7	11
	CONDUCTIVITY	4	4	0	4	4	0	18	18	0	18	18	0
	CYANIDE	4	0	0	4	0	0	9	0	1	9	1	0
	FLUORIDE	4	4	0	4	4	0	18	18	0	18	18	0
	HARDNESS	4	4	0	4	4	0	18	18	0	18	18	0
	MAGNESIUM	4	4	0	4	4	0	18	18	0	18	18	0
	NITRITE	4	2	1	4	0	2	18	0	13	18	0	13
	NITROGEN TOTAL KJELDAHL	4	4	0	4	4	0	18	18	0	18	18	0
	PH	4	4	0	4	4	0	18	18	0	18	18	0
	PHOSPHORUS FIL REACT	4	3	1	4	4	0	.	.	.	.	.	.
	PHOSPHORUS TOTAL	4	3	1	4	2	2	.	.	.	.	.	.
	SODIUM	4	4	0	4	4	0	18	18	0	18	18	0
	TOTAL NITRATES	4	4	0	4	4	0	18	18	0	18	18	0
	TOTAL SOLIDS	4	4	0	4	4	0	18	18	0	18	18	0
	TURBIDITY	4	4	0	4	4	0	18	18	0	18	18	0
*TOTAL SCAN CHEMISTRY (LAB)		76	64	7	76	59	9	297	256	26	297	248	32
METALS	ALUMINUM	4	4	0	4	4	0	18	18	0	18	18	0
	ARSENIC	4	0	0	4	1	0	18	1	0	18	0	0
	BARIUM	4	4	0	4	4	0	18	18	0	18	18	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	SITE											
		RAW			TREATED			SITE 1			SITE 2		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS	BERYLLIUM	4	0	0	4	0	0	18	0	0	18	0	0
	BORON	4	0	4	4	0	4	18	3	14	18	4	13
	CADMIUM	4	0	0	4	0	0	18	0	0	18	0	0
	CHROMIUM	4	3	0	4	3	0	18	8	0	18	9	0
	COBALT	4	0	0	4	0	0	18	0	0	18	0	0
	COPPER	4	2	0	4	3	0	18	18	0	18	18	0
	IRON	4	3	0	4	3	0	18	17	0	18	17	0
	LEAD	4	1	0	4	0	0	18	8	0	18	6	0
	MANGANESE	4	4	0	4	4	0	18	18	0	18	18	0
	MERCURY	4	4	0	4	4	0	9	4	0	9	9	0
	MOLYBDENUM	4	2	0	4	2	0	18	9	0	18	10	0
	NICKEL	4	2	0	4	2	0	18	9	0	18	13	0
	SELENIUM	4	0	0	4	0	0	18	0	0	18	0	0
	STRONTIUM	4	4	0	4	4	0	18	18	0	18	18	0
	URANIUM	4	4	0	4	4	0	18	18	0	18	18	0
	VANADIUM	4	2	0	4	1	0	18	2	0	18	2	0
	ZINC	4	1	0	4	0	0	18	17	0	18	16	0
*TOTAL SCAN METALS		80	40	4	80	39	4	351	186	14	351	194	13
*TOTAL GROUP INORGANIC & PHYSICAL		168	116	11	180	122	13	737	531	40	729	523	45
CHLOROAROMATICS	123 TRICHLOROBENZENE	4	0	0	4	0	0	7	0	0	7	0	0
	1234 TETRACHLOROBENZENE	4	0	0	4	0	0	7	0	0	7	0	0
	1235 TETRACHLOROBENZENE	4	0	0	4	0	0	7	0	0	7	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	SITE			SITE			SITE 1			SITE 2		
		RAW	TREATED		RAW	TREATED		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROAROMATICS	124 TRICHLOROBENZENE	4	0	0	4	0	0	7	0	0	7	0	0
	1245 TETRACHLOROBENZENE	4	0	0	4	0	0	7	0	0	7	0	0
	135 TRICHLOROBENZENE	4	0	0	4	0	0	7	0	0	7	0	0
	236 TRICHLOROTOLUENE	4	0	0	4	0	0	7	0	0	7	0	0
	245 TRICHLOROTOLUENE	4	0	0	4	0	0	7	0	0	7	0	0
	26A TRICHLOROTOLUENE	4	0	0	4	0	0	7	0	0	7	0	0
	HEXACHLOROBUTADIENE	4	0	0	4	0	0	7	0	0	7	0	0
	HEXACHLOROETHANE	4	0	0	4	0	0	7	0	1	7	0	3
	OCTACHLOROSTYRENE	4	0	0	4	0	0	7	0	0	7	0	0
	PENTACHLOROBENZENE	4	0	0	4	0	0	7	0	0	7	0	0
*TOTAL SCAN CHLOROAROMATICS		52	0	0	52	0	0	91	0	1	91	0	3
CHLOROPHENOLS	234 TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	2345 TETRACHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	2356 TETRACHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	245-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	246-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	PENTACHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS		6	0	0	6	0	0	0	0	0	0	0	0
PESTICIDES & PCB	ALACHLOR	4	0	0	4	0	0	8	0	0	8	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	SITE											
		RAW			TREATED			SITE 1			SITE 2		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PESTICIDES & PCB	ALDRIN	4	0	0	4	0	0	7	0	0	7	0	0
	ALPHA BHC	4	0	3	4	0	3	7	0	6	7	0	4
	ALPHA CHLORDANE	4	0	0	4	0	0	7	0	0	7	0	0
	ATRATONE	4	0	0	4	0	0	8	0	0	8	0	0
	BETA BHC	4	0	0	4	0	0	7	0	0	7	0	0
	DICHLORODIPHENYLDICHLOROETHANE	4	0	0	4	0	0	7	0	0	7	0	0
	DIELDRIN	4	0	0	4	0	0	7	0	0	7	0	0
	ENDRIN	4	0	0	4	0	0	7	0	0	7	0	0
	ETHYLENE DIBROMIDE	4	0	0	4	0	0	9	0	0	9	0	0
	GAMMA CHLORDANE	4	0	0	4	0	0	7	0	0	7	0	0
	HEPTACHLOR	4	0	0	4	0	0	7	0	0	7	0	0
	HEPTACHLOR EPOXIDE	4	0	0	4	0	0	7	0	0	7	0	0
	HEXACHLOROBENZENE	4	0	0	4	0	0	7	0	0	7	0	0
	LINDANE	4	0	0	4	0	0	7	0	1	7	0	2
	METHOXYCHLOR	4	0	0	4	0	0	7	0	0	7	0	0
	MIREX	4	0	0	4	0	0	7	0	0	7	0	0
	O,P-DDT	4	0	0	4	0	0	7	0	0	7	0	0
	OXYCHLORDANE	4	0	0	4	0	0	7	0	0	7	0	0
	PCB	4	0	0	4	0	0	7	0	0	7	0	0
	PPDE	4	0	0	4	0	0	7	0	0	7	0	0
	PPDT	4	0	0	4	0	0	7	0	0	7	0	1
	THIODAN I	4	0	0	4	0	0	7	0	0	7	0	0
	THIODAN II	4	0	0	4	0	0	7	0	0	7	0	0
	THIODAN SULPHATE	4	0	0	4	0	0	7	0	0	7	0	0
*TOTAL SCAN PESTICIDES & PCB		100	0	3	100	0	3	179	0	7	179	0	7

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	SITE						SITE 1			SITE 2		
		RAW			TREATED			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PHENOLICS		4	0	0	4	0	0	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS		4	0	0	4	0	0	0	0	0	0	0	0
POLYAROMATIC HYDROC	ANTHANTHRENE	0	0	0	0	0	0	.	.	.	.	.	.
	ANTHRACENE	3	0	0	3	0	0	.	.	.	.	.	.
	BENZO(A) ANTHRACENE	3	0	0	3	0	0	.	.	.	.	.	.
	BENZO (A) PYRENE	3	0	0	3	0	0	.	.	.	.	.	.
	BENZO(B) CHRYSENE	3	0	0	3	0	0	.	.	.	.	.	.
	BENZO(B) FLUORANTHENE	3	0	0	3	0	0	.	.	.	.	.	.
	BENZO(E)PYRENE	3	0	0	3	0	0	.	.	.	.	.	.
	BENZO(G,H,I) PERYLENE	3	0	0	3	0	0	.	.	.	.	.	.
	BENZO(J) FLUORANTHENE	0	0	0	0	0	0	.	.	.	.	.	.
	BENZO(K) FLUORANTHENE	3	0	0	3	0	0	.	.	.	.	.	.
	CHRYSENE	3	0	0	3	0	0	.	.	.	.	.	.
	CORONENE	3	0	0	3	0	0	.	.	.	.	.	.
	DIBENZO(A,H) ANTHRACENE	3	0	0	3	0	0	.	.	.	.	.	.
	DIMETHYL BENZO(A) ANTHRACENE	3	0	0	3	0	0	.	.	.	.	.	.
	FLUORANTHENE	3	0	0	3	0	0	.	.	.	.	.	.
	INDENO(1,2,3-C,D) PYRENE	3	0	0	3	0	0	.	.	.	.	.	.
	PERYLENE	3	0	0	3	0	0	.	.	.	.	.	.
	PHENANTHRENE	3	0	0	3	0	0	.	.	.	.	.	.
	PYRENE	3	0	0	3	0	0	.	.	.	.	.	.
*TOTAL SCAN POLYAROMATIC HYDROC		51	0	0	51	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	SITE						SITE 1			SITE 2		
		RAW		TREATED									
		TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	TOTAL	POSITIVE TRACE	POSITIVE TRACE
SPECIFIC PESTICIDES		1	0	0	1	0	0	.	.	.	.	.	.
	2,4 D PROPIONIC ACID	1	0	0	1	0	0	.	.	.	.	.	.
	2,4,5-T	1	0	0	1	0	0	.	.	.	.	.	.
	2,4-D	1	0	0	1	0	0	.	.	.	.	.	.
	24-DICHLOROPHENOXYBUTYRIC	1	0	0	1	0	0	.	.	.	.	.	.
	AMETRYNE	4	0	0	4	0	0	8	0	0	8	0	0
	AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
	ATRAZINE	4	0	0	4	0	0	8	0	0	8	0	0
	BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.
	BLADEx	4	0	0	4	0	0	8	0	0	8	0	0
	BUX (METALKAMATE)	1	0	0	1	0	0	.	.	.	.	.	.
	CARBOFURAN	1	0	0	1	0	0	.	.	.	.	.	.
	DIALATE	1	0	0	1	0	0	.	.	.	.	.	.
	DIAZINON	1	0	0	1	0	0	.	.	.	.	.	.
	DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.
	DICHLOROVOS	1	0	0	1	0	0	.	.	.	.	.	.
	DURSBAN	1	0	0	1	0	0	.	.	.	.	.	.
	EPTAM	1	0	0	1	0	0	.	.	.	.	.	.
	ETHION	1	0	0	1	0	0	.	.	.	.	.	.
	GUTHION	0	0	0	0	0	0	.	.	.	.	.	.
	IPC	1	0	0	1	0	0	.	.	.	.	.	.
	MALATHION	1	0	0	1	0	0	.	.	.	.	.	.
	METHYL PARATHION	1	0	0	1	0	0	.	.	.	.	.	.
	METHYLTRITHION	1	0	0	1	0	0	.	.	.	.	.	.
	METOLACHLOR	4	0	0	4	0	0	8	0	0	8	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	SITE						SITE 1			SITE 2		
		TOTAL	RAW	POSITIVE	TOTAL	TREATED	POSITIVE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
SPECIFIC PESTICIDES	MEVINPHOS	1	0	0	1	0	0	.	.	.	.	.	.
	PARATHION	1	0	0	1	0	0	.	.	.	.	.	.
	PHORATE (THIMET)	1	0	0	1	0	0	.	.	.	.	.	.
	PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
	PROMETONE	4	0	0	4	0	0	8	0	0	8	0	0
	PROMETRYNE	4	0	0	4	0	0	8	0	0	8	0	0
	PROPAZINE	4	0	0	4	0	0	8	0	0	8	0	0
	PROPOXUR	1	0	0	1	0	0	.	.	.	.	.	.
	RELDAN	1	0	0	1	0	0	.	.	.	.	.	.
	RONNEL	1	0	0	1	0	0	.	.	.	.	.	.
	SENCOR	4	0	0	4	0	0	8	0	0	8	0	0
	SEVIN (CARBARYL)	1	0	0	1	0	0	.	.	.	.	.	.
	SILVEX	1	0	0	1	0	0	.	.	.	.	.	.
	SIMAZINE	4	0	0	4	0	0	8	0	0	8	0	0
	SUTAN (BUTYLATE)	1	0	0	1	0	0	.	.	.	.	.	.
	TOXAPHENE	0	0	0	0	0	0	0	0	0	0	0	0
*TOTAL SCAN SPECIFIC PESTICIDES		63	0	0	63	0	0	72	0	0	72	0	0
VOLATILES	1,1 DICHLOROETHANE	4	0	0	4	0	0	9	0	0	9	0	0
	1,1 DICHLOROETHYLENE	4	0	0	4	0	0	9	0	0	9	0	0
	1,2 DICHLOROBENZENE	4	0	0	4	0	0	9	0	0	9	0	0
	1,2 DICHLOROETHANE	4	0	0	4	0	0	9	0	0	9	0	0
	1,2 DICHLOROPROPANE	4	0	0	4	0	0	9	0	0	9	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P.

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	SITE			RAW			TREATED			SITE 1			SITE 2		
		TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE		
VOLATILES	1,3 DICHLOROBENZENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	1,4 DICHLOROBENZENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	111, TRICHLOROETHANE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	112 TRICHLOROETHANE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	1122 TETRA-CHLOROETHANE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	BENZENE	4	0	0	4	0	0	9	0	1	9	0	1	9	0	0
	BROMOFORM	4	0	0	4	0	3	9	0	3	9	0	3	9	0	3
	CARBON TETRACHLORIDE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	CHLOROBENZENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	CHLORODIBROMOMETHANE	4	0	0	4	4	0	9	9	0	9	9	0	9	9	0
	CHLOROFORM	4	0	1	4	4	0	9	9	0	9	9	0	9	9	0
	DICHLOROBROMOMETHANE	4	0	0	4	4	0	9	9	0	9	9	0	9	9	0
	ETHYLBENZENE	4	0	1	4	0	2	9	0	4	9	0	4	9	0	3
	M-XYLENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	METHYLENE CHLORIDE	4	0	0	4	0	0	8	0	0	8	0	0	8	0	0
	O-XYLENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	P-XYLENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	TETRACHLOROETHYLENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	1
	TOLUENE	4	0	1	4	1	2	9	0	3	9	2	3	9	2	1
	TOTAL TRIHALOMETHANES	4	1	0	4	4	0	9	9	0	9	9	0	9	9	0
	TRANS 1,2 DICHLOROETHYLENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	TRICHLOROETHYLENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
	TRIFLUOROCHLOROTOLUENE	4	0	0	4	0	0	9	0	0	9	0	0	9	0	0
*TOTAL SCAN VOLATILES		112	1	3	112	17	7	251	36	11	251	38	8			
*TOTAL GROUP ORGANIC		388	1	6	388	17	10	593	36	19	593	38	18			

TOTAL		572	133	17	584	142	23	1363	576	59	1364	579	63			

KEY TO TABLES 5 AND 6

- A ONTARIO DRINKING WATER OBJECTIVES
1. Maximum Acceptable Concentration (MAC)
 - 1+. MAC for Total Trihalomethanes
 - 1*. MAC for Bacteriological Analyses
- Poor water quality is indicated when :
- total coliform counts $> 0 < 5$
 - P/A Bottle Test is present after 48 hours
 - Aeromonas organisms are detected in more than 25% of samples in a single submission or in successive submissions from the same sampling site
 - Pseudomonas Aeruginosa, Staphylococcus Aureus and members of the Fecal Streptococcus group should not be detected in any sample
 - Standard Plate Count should not exceed 500 organisms per ml at 35 deg C within 48 hours
2. Interim Maximum Acceptable Concentration (IMAC)
 3. Maximum Desirable Concentration (MDC)
 4. Aesthetic or Recommended Operational Guideline
- hardness levels between 80 and 100 mg/L as calcium carbonate are considered to provide an acceptable balance between corrosion and incrustation, water supplies with a hardness > 200 mg/L are considered poor and those in excess of 500 mg/L are unacceptable.
- B HEALTH & WELFARE CANADA
1. Maximum Acceptable Concentration (MAC)
 2. Proposed MAC
 3. Interim MAC
- C WORLD HEALTH ORGANIZATION
1. Guideline Value (GV)
 2. Tentative GV
 3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
 2. Suggested No-Adverse Effect Level (SNAEL)
 3. Lifetime Health Advisory
 4. EPA Ambient Water Quality Criteria
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
 2. Aesthetic Guideline Level
 3. Maximum Admissible Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- H USSR MAXIMUM PERMISSIBLE CONCENTRATION
- I NEW YORK STATE AMBIENT WATER GUIDELINE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurable Amount
<T	Greater Than Detection Limit But Not Confident
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!AW	No Data: Analysis Withdrawn
!CR	No Data: Could Not Confirm By Reanalysis
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample

RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant
UAL	Unreliable: Sample Age Exceeds Normal Limit
UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminant Interference
XP	Positive After X Number of Hours

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
RAW	TREATED	SITE 1	SITE 2			
		STANDING	FREE FLOW	STANDING	FREE FLOW	
BACTERIOLOGICAL						
AEROMONAS SP (0=ABSENT)		DET'N LIMIT = N/A		GUIDELINE = 0		(A1)
JUN	.	.	.	.	.	0
DEC	.	.	.	.	.	0
E. COLI (P/A) (0=ABSENT)		DET'N LIMIT = N/A		GUIDELINE =		
JUN	.	.	.	.	.	0
DEC	.	.	.	.	.	0
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0		(A1)
SEP	10	.	.	.	.	.
OCT	18	.	.	.	.	.
NOV	9	.	.	.	.	.
DEC	6	.	.	.	.	.
FECAL COLIFORM (0=ABSENT)		DET'N LIMIT = N/A		GUIDELINE = 0		(A1)
JUN	.	.	.	.	.	0
DEC	.	.	.	.	.	1
STANDRD PLATE CNT MF (CT/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML		(A1)
MAR	.	.	.	.	.	!AW
APR	.	.	.	!AW	.	.
MAY	.	.	.	!AW	.	!AW
JUN	.	.	.	!AW	.	350
JUL	.	.	.	860	.	1200
AUG	.	.	.	225	.	880
SEP	480	3	.	270	.	790
OCT	2400 >	0	.	190	.	830
NOV	530	2	.	42	.	212
DEC	440	10	.	21	.	118
P/A BOTTLE (0=ABSENT)		DET'N LIMIT = 0		GUIDELINE = 0		(A1*)
MAR	.	.	.	.	.	0
APR	.	.	.	0	.	.
MAY	.	.	.	0	.	0
JUN	.	.	.	0	.	1
JUL	.	.	.	0	.	0
AUG	.	.	.	0	.	0
SEP	.	0	.	0	.	0
OCT	.	0	.	0	.	0
NOV	.	0	.	0	.	0
DEC	.	0	.	0	.	1

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
STAPH AUREUS (0=ABSENT)			DET'N LIMIT = N/A		GUIDELINE = 0 (A1)	
JUN	.	.	.	.	.	0
DEC	.	.	.	.	.	0
COLIFORM (0=ABSENT)			DET'N LIMIT = N/A		GUIDELINE = 0 (A1)	
JUN	.	.	.	.	.	0
DEC	.	.	.	.	.	1
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)	
MAR	.	.	.	.	.	0
APR	.	.	.	0	.	.
MAY	.	.	.	0	.	0
JUN	.	.	.	0	.	0
JUL	.	.	.	0	.	!OP
AUG	.	.	.	1	.	0
SEP	61 A3C	0	.	0	.	0
OCT	73 A3C	0	.	0	.	0
NOV	50 A3C	0	.	0	.	0
DEC	100 A3C	0	.	0	.	2
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = N/A	
MAR	.	.	.	.	.	0
APR	.	.	.	0	.	.
MAY	.	.	.	1	.	0
JUN	.	.	.	0	.	2400
JUL	.	.	.	1	.	!OP
AUG	.	.	.	0	.	41
SEP	1600	0	.	0	.	87
OCT	1130	0	.	0	.	1
NOV	760	0	.	0	.	20
DEC	490	0	.	0	.	3

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		
			STANDING	FREE FLOW	STANDING	FREE FLOW	

CHEMISTRY (FLD)							
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = N/A		GUIDELINE =		N/A
APR	.	.	.300	.200	.	.	.
MAY	.	.	.400	.	.	.	.100
JUN200	.	.	.
JUL	.	.	.100	.	.	.	.
AUG	.	.	.300	.300	.100	.	.
SEP	.	.100	.100	.	.	.	.
OCT	.	.200	.100	.100	.	.	.
NOV	.	.200	.100	.200	.	.	.
DEC	.	.200	.	.100	.	.	.

FLD CHLORINE FREE (MG/L)			DET'N LIMIT = N/A		GUIDELINE =		N/A
MAR100
APR300	.	.	.
MAY300	.	.	.100
JUN100	.	.	.100
JUL100
AUG100	.	.	.100
SEP	.	.500	.	.100	.	.	.100
OCT	.	.300	.	.200	.100	.	.100
NOV	.	.300	.	.100	.100	.	.100
DEC	.	.300	.	.	.100	.	.100

TOTAL CHLORINE (MG/L)			DET'N LIMIT = N/A		GUIDELINE =		N/A
MAR100	.	.100
APR	.	.	.300	.500	.	.	.
MAY	.	.	.400	.300	.	.	.200
JUN	.	.	.100	.300	.100	.	.100
JUL	.	.	.100	.100	.100	.	.100
AUG	.	.	.300	.400	.100	.	.100
SEP	.	.600	.100	.100	.100	.	.100
OCT	.	.500	.100	.300	.100	.	.100
NOV	.	.500	.100	.300	.100	.	.100
DEC	.	.500	.	.100	.100	.	.100

FLD PH (DMSNLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)		
MAR	7.400	.	7.100
APR	.	.	7.200	7.200	.	.	.
MAY	.	.	7.200	7.400	.	.	7.400
JUN	.	.	7.400	7.400	7.400	.	7.400
JUL	.	.	7.600	7.600	7.300	.	7.100
AUG	.	.	7.800	7.600	7.400	.	7.800
SEP	7.800	7.400	7.400	7.200	7.500	.	7.600

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
OCT	7.800	7.600	7.500	7.500	7.600	7.600
NOV	7.800	7.600	7.600	7.600	7.400	7.600
DEC	7.800	7.600	7.600	7.600	7.600	7.600
TEMPERATURE (DEG.C)			DET'N LIMIT = N/A		GUIDELINE = N/A	
MAR	.	.	.	.	16.000	5.200
APR	.	.	16.000	5.000	.	.
MAY	.	.	16.000	12.000	.	10.000
JUN	.	.	20.000	17.000	18.000	13.000
JUL	.	.	24.000	22.500	20.000	17.000
AUG	.	.	24.000	22.000	20.000	19.000
SEP	18.000	18.500	19.500	19.800	20.000	18.000
OCT	13.800	14.000	19.000	15.200	17.500	16.500
NOV	10.000	9.000	18.000	10.500	16.500	14.500
DEC	5.800	5.800	18.000	7.800	11.000	11.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A		GUIDELINE = 1.0 (A1)	
MAR	.	.	.	.	.310	.470
APR	.	.	.200	.200	.	.
MAY	.	.	.400	.200	.550	.380
JUN	.	.	9.750	4.900	2.200	5.700
AUG	.	.	.650	.410	.550	.940
SEP	10.000	.400	7.000	.470	5.750	.400
OCT	10.500	.420	.590	.550	.400	.460
NOV	1.000	.460	.570	.470	.480	.530
DEC	10.000	.520	.520	.470	.460	.480

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW

CHEMISTRY (LAB)						
ALKALINITY (MG/L)		DET'N LIMIT = .200		GUIDELINE = 30-500 (A4)		
MAR	.	.	.	.	92.500	92.500
APR	.	.	92.100	91.900	.	.
MAY	.	.	91.200	91.200	90.300	91.400
JUN	.	.	90.100	89.800	93.500	92.600
JUL	.	.	88.200	88.200	89.100	89.400
AUG	.	.	88.400	87.700	87.500	90.000
SEP	94.100	89.500	90.300	88.700	90.000	89.900
OCT	96.000	92.000	95.500	93.200	93.500	93.000
NOV	97.600	93.900	94.600	94.900	95.000	94.400
DEC	95.600	92.200	94.400	93.900	94.400	94.100

CALCIUM (MG/L)		DET'N LIMIT = .100		GUIDELINE = 100. (F2)		
MAR	.	.	.	.	39.600	39.500
APR	.	.	40.500	39.600	.	.
MAY	.	.	40.600	40.600	41.000	40.400
JUN	.	.	41.200	41.200	40.000	39.600
JUL	.	.	37.000	36.800	37.600	37.400
AUG	.	.	36.600	37.000	36.600	36.600
SEP	37.200	36.800	37.200	37.000	37.600	37.400
OCT	37.000	37.400	37.400	38.400	38.000	37.000
NOV	38.000	37.800	37.800	37.600	38.200	39.000
DEC	36.800	37.400	37.400	37.000	37.800	37.200

CYANIDE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = .200 (A1)		
MAR	.	.	.	.	.	BDL
APR	.	.	.	BDL	.	.
MAY	.	.	.	BDL	.	BDL
JUN	.	.	.	BDL	.	BDL
JUL	.	.	.	BDL	.	BDL
AUG	.	.	.	.003 <T	.	.006
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL

CHLORIDE (MG/L)		DET'N LIMIT = .200		GUIDELINE = 250.0 (A3)		
MAR	.	.	.	.	23.000	23.000
APR	.	.	23.500	23.500	.	.
MAY	.	.	23.500	23.000	23.000	23.000
JUN	.	.	24.000	24.500	25.000	24.500
JUL	.	.	23.500	23.500	23.500	23.500
AUG	.	.	24.500	25.000	25.500	24.500

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SEP	23.000	24.500	24.500	24.500	24.500	24.500
OCT	22.800	24.500	24.200	24.300	23.900	24.400
NOV	22.400	23.400	23.300	23.200	23.300	23.200
DEC	22.300	23.300	23.200	23.100	23.400	23.300

COLOUR (TCU)			DET'N LIMIT = .5		GUIDELINE = 5.0 (A3)	
MAR	.	.	.	.	2.000 <T	3.000
APR	.	.	1.500 <T	1.500 <T	.	.
MAY	.	.	1.500 <T	1.000 <T	2.000 <T	.500 <T
JUN	.	.	4.000	3.000	1.000 <T	2.000 <T
JUL	.	.	6.000	6.500	2.500	2.000 <T
AUG	.	.	1.500 <T	1.500 <T	1.500 <T	2.500
SEP	1.500 <T	1.000 <T	3.000	3.000	1.500 <T	1.500 <T
OCT	2.000 <T	1.000 <T	3.000	1.500 <T	2.000 <T	2.000 <T
NOV	2.500	1.500 <T	1.500 <T	5.000	5.000	4.500
DEC	3.000	2.000 <T	2.500	2.000 <T	2.500	2.500

CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1		GUIDELINE = 400. (F2)	
MAR	.	.	.	.	327	326
APR	.	.	325	327	.	.
MAY	.	.	329	327	327	326
JUN	.	.	331	328	331	328
JUL	.	.	314	311	317	317
AUG	.	.	316	316	318	311
SEP	309	313	314	305	309	308
OCT	311	313	312	314	315	314
NOV	313	316	316	317	317	316
DEC	312	315	320	317	319	318

FLUORIDE (MG/L)			DET'N LIMIT = .01		GUIDELINE = 2.400 (A1)	
MAR	.	.	.	.	.970	.940
APR	.	.	.950	1.000	.	.
MAY	.	.	.130	.120	.100	.130
JUN	.	.	1.010	1.010	1.030	1.020
JUL	.	.	.190	.190	.220	.220
AUG	.	.	1.080	1.030	.970	1.030
SEP	.120	1.300	1.080	1.080	1.020	1.020
OCT	.140	1.140	1.000	.940	.980	.940
NOV	.120	1.000	1.000	.980	1.020	1.000
DEC	.120	1.080	1.060	1.080	1.040	1.060

HARDNESS (MG/L)			DET'N LIMIT = .500		GUIDELINE = 80-100 (A4)	
MAR	.	.	.	.	132.500	132.000

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	.	.	135.500	133.000	.	.
MAY	.	.	133.000	133.000	133.000	131.000
JUN	.	.	136.000	136.000	133.000	132.000
JUL	.	.	127.000	126.000	128.000	128.000
AUG	.	.	127.000	128.000	126.000	126.000
SEP	128.000	127.000	128.000	127.000	129.000	128.000
OCT	127.000	129.000	129.000	131.000	130.000	128.000
NOV	129.000	130.000	129.000	129.000	130.000	133.000
DEC	129.000	130.000	130.000	129.000	129.000	128.000

MAGNESIUM (MG/L) DET'N LIMIT = .050 GUIDELINE = 30. (F2)						
MAR	.	.	.	.	8.200	8.100
APR	.	.	8.300	8.200	.	.
MAY	.	.	7.600	7.500	7.500	7.300
JUN	.	.	8.000	8.100	8.000	8.100
JUL	.	.	8.300	8.200	8.300	8.300
AUG	.	.	8.700	8.500	8.400	8.400
SEP	8.500	8.600	8.500	8.500	8.600	8.400
OCT	8.500	8.600	8.700	8.600	8.700	8.600
NOV	8.400	8.500	8.400	8.400	8.500	8.500
DEC	8.900	8.900	8.900	8.900	8.400	8.500

SODIUM (MG/L) DET'N LIMIT = .200 GUIDELINE = 200. (C3)						
MAR	.	.	.	.	11.900	11.600
APR	.	.	11.800	11.500	.	.
MAY	.	.	11.800	11.800	11.600	11.800
JUN	.	.	12.000	12.200	12.200	11.600
JUL	.	.	11.600	11.600	11.800	11.600
AUG	.	.	11.800	11.600	12.000	11.800
SEP	11.800	12.000	12.200	12.000	12.600	12.000
OCT	12.200	12.200	12.000	12.400	12.200	12.200
NOV	11.800	12.000	12.000	12.000	12.000	12.000
DEC	12.200	12.400	12.400	12.400	12.000	12.000

AMMONIUM TOTAL (MG/L) DET'N LIMIT = 0.002 GUIDELINE = .05 (F2)						
MAR	.	.	.	.	BDL	BDL
APR	.	.	.008 <T	BDL	.	.
MAY	.	.	.014	.004 <T	.010	.004 <T
JUN	.	.	.082	.018	.012	.012
JUL	.	.	.154	.046	.002 <T	.006 <T
AUG	.	.	.112	.008 <T	.008 <T	.010
SEP	.008 <T	.008 <T	.126	.022	.006 <T	.006 <T
OCT	.044	.016	.028	.018	.012	.012
NOV	.012	BDL	.064	.010	.004 <T	.004 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
DEC	.006 <T	BDL	.154	BDL	BDL	BDL
NITRITE (MG/L)	DET'N LIMIT = 0.001		GUIDELINE = 1.000 (A1)			
MAR	.	.	.	.	BDL	BDL
APR	.	.	.002 <T	BDL	.	.
MAY	.	.	BDL	.001 <T	BDL	.001 <T
JUN	.	.	.002 <T	.002 <T	.002 <T	.002 <T
JUL	.	.	.002 <T	.001 <T	.001 <T	.001 <T
AUG	.	.	.001 <T	.001 <T	.003 <T	.003 <T
SEP	.007	.003 <T	.003 <T	.003 <T	.004 <T	.003 <T
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	.004 <T	.001 <T	.001 <T	.001 <T	.001 <T	.002 <T
DEC	.006	BDL	BDL	.001 <T	.001 <T	.001 <T
TOTAL NITRATES (MG/L)	DET'N LIMIT = .020		GUIDELINE = 10.000 (A1)			
MAR	.	.	.	.	.295	.285
APR	.	.	.295	.280	.	.
MAY	.	.	.320	.285	.305	.285
JUN	.	.	.535	.255	.255	.245
JUL	.	.	.440	.210	.170	.165
AUG	.	.	.365	.170	.145	.150
SEP	.140	.115	.365	.140	.130	.120
OCT	.185	.165	.200	.180	.180	.195
NOV	.215	.205	.290	.210	.210	.210
DEC	.225	.225	.450	.245	.235	.240
NITROGEN TOT KJELD (MG/L)	DET'N LIMIT = .020		GUIDELINE = N/A			
MAR	.	.	.	.	.160	.110
APR	.	.	.200	.140	.	.
MAY	.	.	.150	.120	.120	.110
JUN	.	.	.260	.150	.150	.140
JUL	.	.	.350	.190	.110	.170
AUG	.	.	.290	.160	.160	.200
SEP	.220	.220	.320	.200	.190	.190
OCT	.320	.200	.210	.190	.220	.210
NOV	.240	.200	.280	.210	.200	.220
DEC	.210	.190	.340	.200	.180	.180
PH (DMSNLESS)	DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
MAR	.	.	.	.	8.070	8.090
APR	.	.	8.090	8.130	.	.
MAY	.	.	8.120	8.160	8.140	8.140
JUN	.	.	8.050	8.080	8.200	8.200

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	.	.	8.060	8.100	8.100	8.090
AUG	.	.	8.030	7.990	7.970	8.000
SEP	8.300	8.220	8.260	8.110	8.110	8.150
OCT	8.290	8.200	8.260	8.240	8.190	8.160
NOV	8.260	8.110	8.170	8.160	8.170	8.180
DEC	8.250	8.230	8.310	8.340	8.310	8.340

PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = .5UG/L		GUIDELINE = N/A	
SEP	.004	.006	.	.	.	.
OCT	.006	.002	.	.	.	.
NOV	.001 <T	.002	.	.	.	.
DEC	.002	.003	.	.	.	.

PHOSPHORUS TTL-UNFIL (MG/L)			DET'N LIMIT = .002		GUIDELINE = .40 (F2)	
SEP	.026	.025	.	.	.	.
OCT	.025	.005 <T	.	.	.	.
NOV	.009 <T	.009 <T	.	.	.	.
DEC	.010	.010	.	.	.	.

RESIDUE (TOTAL) (MG/L)			DET'N LIMIT = 1.		GUIDELINE = 500. (A3)	
MAR	.	.	.	.	213 CRO	212 CRO
APR	.	.	211 CRO	213 CRO	.	.
MAY	.	.	214 CRO	213 CRO	213 CRO	212 CRO
JUN	.	.	215 CRO	213 CRO	215 CRO	213 CRO
JUL	.	.	204 CRO	202 CRO	206 CRO	206 CRO
AUG	.	.	205 CRO	205 CRO	207 CRO	202 CRO
SEP	201 CRO	203 CRO	204 CRO	198 CRO	201 CRO	200 CRO
OCT	405 CRO	203 CRO	203 CRO	204 CRO	205 CRO	204 CRO
NOV	203 CRO	205 CRO	205 CRO	206 CRO	206 CRO	205 CRO
DEC	203 CRO	205 CRO	208 CRO	206 CRO	207 CRO	207 CRO

TURBIDITY (FTU)			DET'N LIMIT = .02		GUIDELINE = 1.00 (A1)	
MAR	.	.	.	.	.170	.320
APR	.	.	.370	.240	.	.
MAY	.	.	.400	.210	.550	.380
JUN	.	.	.760	.370	.250	.380
JUL	.	.	.870	.860	.380	.400
AUG	.	.	.400	.350	.330	.570
SEP	1.010	.270	.490	.340	.250	.290
OCT	8.900	.260	.320	.400	.240	.320
NOV	.760	.280	.400	.280	.300	.290
DEC	.450	.450	.470	.430	.310	.300

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW

METALS						
ALUMINUM (MG/L)			DET'N LIMIT = .004	GUIDELINE = .10	(A4)	
MAR	.	.	.	.	.054	.058
APR	.	.	.061	.068	.	.
MAY	.	.	.072	.063	.061	.050
JUN	.	.	.100	.110	.074	.077
JUL	.	.	.140	.130	.098	.100
AUG	.	.	.180	.150	.120	.200
SEP	.069	.022	.084	.088	.083	.071
OCT	.220	.014	.091	.060	.050	.043
NOV	.026	.015	.084	.033	.045	.044
DEC	.029	.012	.057	.021	.029	.028

ARSENIC (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = .050	(A1)	
MAR	.	.	.	.	BDL	BDL
APR	.	.	BDL	BDL	.	.
MAY	.	.	BDL	BDL	BDL	BDL
JUN	.	.	BDL	BDL	BDL	BDL
JUL	.	.	BDL	BDL	BDL	BDL
AUG	.	.	BDL	BDL	BDL	BDL
SEP	BDL	.001	.001	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL

BARIUM (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1.000	(A1)	
MAR	.	.	.	.	.022	.020
APR	.	.	.020	.020	.	.
MAY	.	.	.023	.023	.023	.022
JUN	.	.	.023	.023	.021	.020
JUL	.	.	.024	.024	.021	.020
AUG	.	.	.018	.018	.018	.012
SEP	.017	.016	.018	.018	.019	.018
OCT	.020	.017	.018	.016	.015	.014
NOV	.019	.019	.021	.019	.018	.018
DEC	.019	.019	.021	.019	.019	.018

BORON (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 5.000	(A1)	
MAR	.	.	.	.	.020	.020
APR	.	.	.030	BDL	.	.
MAY	.	.	.020 <T	.030 <T	.040 <T	.020 <T
JUN	.	.	.040	.020	.030	.030
JUL	.	.	.020 <T	.030 <T	.020 <T	.030 <T
AUG	.	.	.010 <T	.020 <T	.030 <T	BDL

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DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SEP	.030 <T	.010 <T	.020 <T	.020 <T	.010 <T	.010 <T
OCT	.020 <T	.020 <T	.010 <T	.010 <T	.020 <T	.030 <T
NOV	.030 <T	.030 <T	.030 <T	.030 <T	.030 <T	.030 <T
DEC	.020 <T	.011 <T	.026 <T	.016 <T	.033 <T	.023 <T
<hr/>						
CHROMIUM (MG/L)	DET'N LIMIT = 0.001		GUIDELINE = .05 (A1)			
MAR	.	.	.	.	BDL	BDL
APR	.	.	BDL	BDL	.	.
MAY	.	.	BDL	BDL	.001	.001
JUN	.	.	BDL	BDL	.001	.001
JUL	.	.	.001	BDL	BDL	.001
AUG	.	.	BDL	BDL	BDL	BDL
SEP	BDL	BDL	.006	BDL	BDL	BDL
OCT	.002	.001	.004	.002	BDL	BDL
NOV	.002	.002	.006	.002	.002	.002
DEC	.002	.002	.003	.002	.002	.001
<hr/>						
COPPER (MG/L)	DET'N LIMIT = .001		GUIDELINE = 1.0 (A3)			
MAR	.	.	.	.	.130	.009
APR	.	.	.076	.010	.	.
MAY	.	.	.051	.034	.079	.011
JUN	.	.	.037	.019	.045	.007
JUL	.	.	.026	.021	.030	.008
AUG	.	.	.028	.025	.032	.007
SEP	.001	.001	.015	.008	.044	.010
OCT	.002	.001	.024	.003	.034	.011
NOV	BDL	BDL	.025	.004	.053	.012
DEC	BDL	.001	.038	.004	.071	.018
<hr/>						
IRON (MG/L)	DET'N LIMIT = .002		GUIDELINE = .300 (A3)			
MAR	.	.	.	.	.035	.061
APR	.	.	.030	.029	.	.
MAY	.	.	.140	.082	.220	.080
JUN	.	.	.200	.190	.071	.080
JUL	.	.	.290	.320	.057	.074
AUG	.	.	.008	.002	.030	.046
SEP	.062	.010	.079	.094	.044	.065
OCT	.240	.011	.073	.026	.027	.032
NOV	BDL	BDL	.080	BDL	BDL	.060
DEC	.029	.015	.052	.039	.042	.045
<hr/>						
MERCURY (UG/L)	DET'N LIMIT = 0.010		GUIDELINE = 1.000 (A1)			
MAR	.	.	.	.	.	.020

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	.	.	.	BDL	.	.
MAY	.	.	.	BDL	.	.030
JUN	.	.	.	BDL	.	.080
JUL	.	.	.	BDL	.	.050
AUG	.	.	.	BDL	.	.110
SEP	.010	.010	.	.010	.	.380
OCT	.010	.010	.	.010	.	.240
NOV	.010	.010	.	.010	.	.100
DEC	.010	.010	.	.010	.	.150
<hr/>						
MANGANESE (MG/L) DET'N LIMIT = .001 GUIDELINE = .050 (A3)						
MAR	.	.	.	.	.002	.002
APR	.	.	.002	.002	.	.
MAY	.	.	.006	.011	.004	.003
JUN	.	.	.010	.013	.002	.003
JUL	.	.	.017	.024	.003	.003
AUG	.	.	.008	.008	.002	.003
SEP	.004	.001	.010	.012	.003	.003
OCT	.012	.002	.006	.004	.002	.002
NOV	.002	.001	.005	.005	.003	.003
DEC	.003	.002	.005	.004	.003	.003
<hr/>						
MOLYBDENUM (MG/L) DET'N LIMIT = 0.001 GUIDELINE = .50 (H)						
MAR	.	.	.	.	.001	.001
APR	.	.	.001	.001	.	.
MAY	.	.	BDL	.001	BDL	.001
JUN	.	.	BDL	BDL	.001	.001
JUL	.	.	BDL	BDL	BDL	BDL
AUG	.	.	.001	.001	.002	.001
SEP	.001	.001	.001	.001	BDL	.001
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.001	BDL	.002	BDL
DEC	.001	.001	.001	BDL	.001	BDL
<hr/>						
NICKEL (MG/L) DET'N LIMIT = 0.001 GUIDELINE = .05 (F3)						
MAR	.	.	.	.	.003	.003
APR	.	.	BDL	BDL	.	.
MAY	.	.	.002	BDL	.002	BDL
JUN	.	.	.005	BDL	.003	BDL
JUL	.	.	.003	BDL	.002	BDL
AUG	.	.	BDL	BDL	.002	.002
SEP	BDL	BDL	BDL	BDL	.005	BDL
OCT	.002	.001	.002	.001	.002	.001
NOV	BDL	BDL	.003	.004	.006	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
DEC	.002	.002	.003	.001	.003	.004
LEAD (MG/L)	DET'N LIMIT = 0.003		GUIDELINE = .050 (A1)			
MAR	.	.	.	.	.007	BDL
APR	.	.	.006	BDL	.	.
MAY	.	.	BDL	BDL	BDL	BDL
JUN	.	.	.005	BDL	.006	BDL
JUL	.	.	BDL	BDL	BDL	BDL
AUG	.	.	.010	.008	BDL	.006
SEP	BDL	BDL	.007	BDL	.003	.004
OCT	BDL	BDL	.005	BDL	BDL	BDL
NOV	.011	BDL	.006	BDL	.004	BDL
DEC	BDL	BDL	.006	BDL	BDL	BDL
STRONTIUM (MG/L)	DET'N LIMIT = .001		GUIDELINE = 2.00 (H)			
MAR	.	.	.	.	.170	.170
APR	.	.	.170	.170	.	.
MAY	.	.	.190	.190	.190	.180
JUN	.	.	.180	.180	.180	.170
JUL	.	.	.190	.190	.170	.170
AUG	.	.	.150	.150	.150	.130
SEP	.140	.140	.160	.160	.160	.160
OCT	.150	.150	.150	.150	.130	.130
NOV	.160	.160	.160	.160	.150	.160
DEC	.170	.170	.170	.170	.170	.170
URANIUM (UG/L)	DET'N LIMIT = .02		GUIDELINE = 20. (A2)			
MAR	.	.	.	.	.260	.250
APR	.	.	.250	.250	.	.
MAY	.	.	.240	.250	.280	.270
JUN	.	.	.200	.190	.190	.210
JUL	.	.	.230	.240	.220	.210
AUG	.	.	.020	.020	.020	.020
SEP	.410	.410	.430	.420	.430	.400
OCT	.410	.440	.450	.460	.450	.410
NOV	.350	.370	.360	.370	.390	.380
DEC	.300	.300	.300	.300	.300	.300
VANADIUM (MG/L)	DET'N LIMIT = .001		GUIDELINE = .10 (H)			
MAR	.	.	.	.	BDL	BDL
APR	.	.	BDL	BDL	.	.
MAY	.	.	BDL	BDL	BDL	BDL
JUN	.	.	BDL	BDL	BDL	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	.	.	BDL	BDL	BDL	BDL
AUG	.	.	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	.001	BDL	BDL	BDL	BDL	.001
NOV	.001	.002	.001	.002	.002	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
<hr/>						
ZINC (MG/L)			DET'N LIMIT = .001		GUIDELINE = 5.00 (A3)	
MAR	.	.	.	.	.055	BDL
APR	.	.	.074	BDL	.	.
MAY	.	.	.045	.006	.038	.005
JUN	.	.	.035	.004	.014	.002
JUL	.	.	.034	.005	.015	.003
AUG	.	.	.072	.041	.038	.025
SEP	.001	BDL	.015	.001	.023	.001
OCT	BDL	BDL	.026	.003	.010	.003
NOV	BDL	BDL	.027	.013	.013	BDL
DEC	BDL	BDL	.036	.003	.015	.004

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW

CHLOROAROMATICS						
HEXACHLOROETHANE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 1900. (D4)		
MAR	.	.	.	.	.	5.000 <T
APR	.	.	.	BDL	.	.
MAY	.	.	.	BDL	.	BDL
JUN	.	.	.	BDL	.	BDL
JUL	.	.	.	1.000 <T	.	1.000 <T
AUG	.	.	.	BDL	.	4.000 <T
SEP	BDL	BDL	.	BDL	.	.
OCT	BDL	BDL	.	!LA	.	BDL
NOV	BDL	BDL	.	!IS	.	BDL
DEC	BDL	BDL	.	BDL	.	!LA

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		
			STANDING	FREE FLOW	STANDING	FREE FLOW	

PESTICIDES & PCB							
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700. (G)		
MAR	.	.	.	.	.	1.000 <T
APR	.	.	.	BDL	.	.	
MAY	.	.	.	1.000 <T	.	2.000 <T	
JUN	.	.	.	2.000 <T	.	BDL	
JUL	.	.	.	1.000 <T	.	1.000 <T	
AUG	.	.	.	2.000 <T	.	2.000 <T	
SEP	1.000 <T	2.000 <T	.	1.000 <T	.	.	
OCT	2.000 <T	2.000 <T	.	!LA	.	BDL	
NOV	BDL	BDL	.	!IS	.	BDL	
DEC	2.000 <T	2.000 <T	.	1.000 <T	.	!LA	

LINDANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 4000.0 (A1)		
MAR	.	.	.	.	.	BDL
APR	.	.	.	BDL	.	.	
MAY	.	.	.	BDL	.	2.000 <T	
JUN	.	.	.	1.000 <T	.	BDL	
JUL	.	.	.	BDL	.	1.000 <T	
AUG	.	.	.	BDL	.	BDL	
SEP	BDL	BDL	.	BDL	.	.	
OCT	BDL	BDL	.	!LA	.	BDL	
NOV	BDL	BDL	.	!IS	.	BDL	
DEC	BDL	BDL	.	BDL	.	!LA	

PPDDT (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 30000. (A1)		
MAR	.	.	.	.	.	BDL
APR	.	.	.	BDL	.	.	
MAY	.	.	.	BDL	.	BDL	
JUN	.	.	.	BDL	.	5.000 <T	
JUL	.	.	.	BDL	.	BDL	
AUG	.	.	.	BDL	.	BDL	
SEP	BDL	BDL	.	BDL	.	.	
OCT	BDL	BDL	.	!LA	.	BDL	
NOV	BDL	BDL	.	!IS	.	BDL	
DEC	BDL	BDL	.	BDL	.	!LA	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		
			STANDING	FREE FLOW	STANDING	FREE FLOW	

VOLATILES							
BENZENE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 5.0		(D1)	
MAR	.	.	.	.	.	.	BDL
APR	.	.	.	BDL	.	.	.
MAY	.	.	.	BDL	.	.	BDL
JUN	.	.	.	BDL	.	.	BDL
JUL	.	.	.	BDL	.	.	BDL
AUG	.	.	.	BDL	.	.	BDL
SEP	BDL	BDL	.	BDL	.	.	BDL
OCT	BDL	BDL	.	BDL	.	.	BDL
NOV	BDL	BDL	.	.050 <T	.	.	BDL
DEC	BDL	BDL	.	BDL	.	.	BDL

TOLUENE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 100.0		(G)	
MAR	.	.	.	.	.	.	BDL
APR	.	.	.	BDL	.	.	.
MAY	.	.	.	BDL	.	.	BDL
JUN	.	.	.	BDL	.	.	BDL
JUL	.	.	.	BDL	.	.	BDL
AUG	.	.	.	BDL	.	.	BDL
SEP	BDL	.050 <T	.	.050 <T	.	.	.550
OCT	BDL	.100 UCS	.	.650 <T	.	.	.100 UCS
NOV	.100 <T	.100 <T	.	.150 <T	.	.	.100 <T
DEC	BDL	BDL	.	BDL	.	.	BDL

ETHYLBENZENE (UG/L)		DET'N LIMIT = 0		GUIDELINE = 3400.		(D3)	
MAR	.	.	.	.	.	.	BDL
APR	.	.	.	BDL	.	.	.
MAY	.	.	.	BDL	.	.	BDL
JUN	.	.	.	BDL	.	.	BDL
JUL	.	.	.	.150 <T	.	.	BDL
AUG	.	.	.	.200 <T	.	.	.150 <T
SEP	BDL	BDL	.	BDL	.	.	BDL
OCT	BDL	BDL	.	.050 <T	.	.	.050 <T
NOV	.050 <T	.100 <T	.	.050 <T	.	.	.050 <T
DEC	BDL	.050 <T	.	BDL	.	.	BDL

CHLOROFORM (UG/L)		DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)			
MAR	.	.	.	.	.	.	8.000
APR	.	.	.	15.000	.	.	.
MAY	.	.	.	11.000	.	.	10.000
JUN	.	.	.	11.500	.	.	11.900
JUL	.	.	.	12.000	.	.	13.000
AUG	.	.	.	14.100	.	.	12.100

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SEP	.200 <T	17.100	.	10.700	.	15.500
OCT	BDL	16.900	.	11.100	.	9.300
NOV	BDL	14.500	.	9.300	.	7.600
DEC	BDL	13.800	.	12.400	.	8.400
<hr/>						
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)	
MAR	.	.	.	.	.	6.000
APR	.	.	.	9.000	.	.
MAY	.	.	.	8.000	.	7.000
JUN	.	.	.	8.300	.	8.100
JUL	.	.	.	8.000	.	9.000
AUG	.	.	.	9.400	.	8.300
SEP	BDL	13.800	.	9.200	.	10.600
OCT	BDL	11.100	.	7.900	.	6.900
NOV	BDL	11.400	.	7.500	.	6.400
DEC	BDL	10.900	.	9.700	.	6.900
<hr/>						
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)	
MAR	.	.	.	.	.	2.000
APR	.	.	.	3.000	.	.
MAY	.	.	.	5.000	.	4.000
JUN	.	.	.	4.500	.	4.600
JUL	.	.	.	6.000	.	6.000
AUG	.	.	.	4.900	.	4.600
SEP	BDL	7.100	.	5.200	.	6.100
OCT	BDL	5.600	.	4.300	.	4.200
NOV	BDL	5.300	.	3.700	.	3.200
DEC	BDL	5.000	.	4.400	.	3.200
<hr/>						
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0		GUIDELINE = 10.0 (C2)	
MAR	.	.	.	.	.	BDL
APR	.	.	.	BDL	.	.
MAY	.	.	.	BDL	.	BDL
JUN	.	.	.	BDL	.	BDL
JUL	.	.	.	BDL	.	BDL
AUG	.	.	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	.250 <T
DEC	BDL	BDL	.	BDL	.	BDL
<hr/>						
BROMOFORM (UG/L)			DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)	
MAR	.	.	.	.	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	.	.	.	BDL	.	.
MAY	.	.	.	BDL	.	BDL
JUN	.	.	.	BDL	.	BDL
JUL	.	.	.	BDL	.	BDL
AUG	.	.	.	BDL	.	BDL
SEP	BDL	.800 <T	.	.600 <T	.	.600 <T
OCT	BDL	.200 <T	.	.400 <T	.	.200 <T
NOV	BDL	.400 <T	.	.400 <T	.	.400 <T
DEC	BDL	BDL	.	BDL	.	BDL

TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0		GUIDELINE = 350.0 (A1)	
MAR	.	.	.	.	.	16.000
APR	.	.	.	27.000	.	.
MAY	.	.	.	24.000	.	21.000
JUN	.	.	.	24.300	.	24.600
JUL	.	.	.	26.000	.	28.000
AUG	.	.	.	28.400	.	25.000
SEP	.200	38.800	.	25.700	.	32.800
OCT	BDL	33.800	.	23.700	.	20.600
NOV	BDL	31.600	.	20.900	.	17.600
DEC	BDL	29.700	.	26.500	.	18.500

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN -----	PARAMETER -----	ANALYSED -----	DETECTION LIMIT -----	GUIDELINE -----	
METALS	BERYLLIUM	44	0.001	.0002 (H)	MG/L
	CADMIUM	44	0.300	5.000 (A1)	UG/L
	COBALT	44	0.001	1.0 (H)	MG/L
	SELENIUM	44	0.001	.010 (A1)	MG/L
CHLOROAROMATICS	HEXACHLOROBUTADIENE	25	1.000	450. (D4)	NG/L
	123 TRICHLOROBENZENE	25	5.000	10000. (I)	NG/L
	1234 T-CHLOROBENZENE	25	1.000	10000. (I)	NG/L
	1235 T-CHLOROBENZENE	25	1.000	10000. (I)	NG/L
	124 TRICHLOROBENZENE	25	5.000	10000. (I)	NG/L
	1245 T-CHLOROBENZENE	25	1.000	38000. (D4)	NG/L
	135 TRICHLOROBENZENE	25	5.000	10000. (D4)	NG/L
	OCTACHLOROSTYRENE	25	1.000	N/A	NG/L
	PENTACHLOROBENZENE	25	1.000	74000. (D4)	NG/L
	236 TRICHLOROTOLUENE	25	5.000	N/A	NG/L
	245 TRICHLOROTOLUENE	25	5.000	N/A	NG/L
	26A TRICHLOROTOLUENE	25	5.000	N/A	NG/L
CHLOROPHENOLS	234 TRICHLOROPHENOL	2	50.	N/A	NG/L
	2345 T-CHLOROPHENOL	2	50.	N/A	NG/L
	2356 T-CHLOROPHENOL	2	50.	N/A	NG/L
	245-TRICHLOROPHENOL	2	50.	2600000(D4)	NG/L
	246-TRICHLOROPHENOL	2	50.	10000. (C1)	NG/L
	PENTACHLOROPHENOL	2	50.	10000. (C1)	NG/L
PESTICIDES & PCB	ALDRIN	25	1.000	700.0 (A1)	NG/L
	BETA BHC	25	1.000	300. (G)	NG/L
	ALPHA CHLORDANE	25	2.000	7000.0 (A1)	NG/L
	GAMMA CHLORDANE	25	2.000	7000.0 (A1)	NG/L
	DIELDRIN	25	2.000	700.0 (A1)	NG/L
	METHOXYCHLOR	25	5.000	100000. (A1)	NG/L
	THIODAN I	25	2.000	74000. (D4)	NG/L
	THIODAN II	25	4.000	74000. (D4)	NG/L
	ENDRIN	25	4.000	200.0 (A1)	NG/L
	THIODAN SULPHATE	25	4.000	N/A	NG/L
	HEPTACHLOR EPOXIDE	25	1.000	3000.0 (A1)	NG/L
	HEPTACHLOR	25	1.000	3000.0 (A1)	NG/L
	MIREX	25	5.000	N/A	NG/L
	OXYCHLORDANE	25	2.000	N/A	NG/L
	OPDDT	25	5.000	30000. (A1)	NG/L
	PCB	25	20.000	3000. (A2)	NG/L
	PP-DDD	25	5.000	N/A	NG/L
	PPDDE	25	1.000	30000. (A1)	NG/L
	ATRATONE	26	50.	N/A	NG/L
	ALACHLOR	26	500.	35000. (D2)	NG/L
PHENOLICS	ETHYLENE DIBROMIDE	26	0	50.0 (G)	UG/L
	PCB	25	1.000	10.0 (C1)	NG/L
PHENOLICS	PHENOL	8	0.2	2.00 (A3)	UG/L
POLYAROMATIC HYDROC	PHENANTHRENE	8	0	N/A	NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE
-----	-----	-----	-----	-----
POLYAROMATIC HYDROC	ANTHRACENE	8	0	N/A NG/L
	FLUORANTHENE	8	0	42000 (D4) NG/L
	PYRENE	8	0	N/A NG/L
	BENZO(A)ANTHRACENE	8	0	N/A NG/L
	CHRYSENE	8	0	N/A NG/L
	DIMETH. BENZ(A)ANTHR	8	0	N/A NG/L
	BENZO(E)PYRENE	8	0	N/A NG/L
	BENZO(J) FLUORANTHEN	8	N/A	N/A NG/L
	BENZO(B) FLUORANTHEN	8	0	N/A NG/L
	PERYLENE	8	0	N/A NG/L
	BENZO(K) FLUORANTHEN	8	N/A	N/A NG/L
	BENZO (A) PYRENE	8	0	10 (B1) NG/L
	BENZO(G,H,I) PERYLEN	8	0	N/A NG/L
	DIBENZO(A,H) ANTHRAC	8	0	N/A NG/L
	INDENO(1,2,3-C,D) PY	8	0	N/A NG/L
	BENZO(B) CHRYSENE	8	0	N/A NG/L
	ANTHANTHRENE	8	N/A	N/A NG/L
	CORONENE	8	0	N/A NG/L
SPECIFIC PESTICIDES	TOXAPHENE	25	N/A	5000. (A1) NG/L
	AMETRYNE	26	50.00	300000. (D3) NG/L
	ATRAZINE	26	50.00	60000. (B3) NG/L
	BLADIX	26	100.00	10000. (B3) NG/L
	PROMETONE	26	50.00	52500. (D3) NG/L
	PROPAZINE	26	50.00	16000. (D2) NG/L
	PROMETRYNE	26	50.00	1000. (B3) NG/L
	SENCOR	26	100.00	80000. (B2) NG/L
	SIMAZINE	26	50.00	10000. (B3) NG/L
	2,4,5-T	2	50.00	35000. (D2) NG/L
	2,4-D	2	100.00	100000. (A1) NG/L
	2,4-DCLRPHENOXYBUTYRC	2	200.00	18000. (B3) NG/L
	2,4-DP	2	100.00	N/A NG/L
	DICAMBA	2	100.00	87000. (B3) NG/L
	PICHLORAM	2	100.00	2450000 (D3) NG/L
	SILVEX	2	50.00	10000. (A1) NG/L
	DIAZINON	2	20.	14000. (A1) NG/L
	DICHLOROVOS	2	20.	N/A NG/L
	DURSBAN	2	20.	N/A NG/L
	ETHION	2	20.	35000. (G) NG/L
	GUTHION	2	N/A	N/A NG/L
	MALATHION	2	20.	160000. (G) NG/L
	MEVINPHOS	2	20.	N/A NG/L
	METHYL PARATHION	2	50.	7000. (B3) NG/L
	METHYLTRITHION	2	20.	N/A NG/L
	PARATHION	2	20.	35000. (B1) NG/L
	PHORATE	2	20.	35.0 (D2) NG/L
	RELDAN	2	20.	N/A NG/L
	RONNEL	2	20.	N/A NG/L
	AMINOCARB	2	N/A	N/A NG/L
	BENOMYL	2	N/A	N/A NG/L
	BUX	2	2000.	N/A NG/L
	CARBOFURAN	2	2000.	18000. (D3) NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM CORNWALL W.T.P. 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE
----	-----	-----	-----	-----
SPECIFIC PESTICIDES	CIPC	2	2000.	350000. (G) NG/L
	DIALATE	2	2000.	30000. (H) NG/L
	EPTAM	2	2000.	N/A NG/L
	IPC	2	2000.	N/A NG/L
	PROPOXUR	2	2000.	90000. (G) NG/L
	SEVIN	2	200.	70000. (A1) NG/L
	SUTAN	2	2000.	245000. (D3) NG/L
	METOLACHLOR	26	500.	50000. (B3) NG/L
VOLATILES	P-XYLENE	26	0	620. (G) UG/L
	M-XYLENE	26	0	620. (G) UG/L
	O-XYLENE	26	0	620. (G) UG/L
	1,1 DICHLOROETHYLENE	26	0	7.0 (D1) UG/L
	DICHLOROMETHANE	26	0	1750. (D3) UG/L
	1,1,2 DICHLOROETHYLENE	26	0	350. (D3) UG/L
	1,1 DICHLOROETHANE	26	0	N/A UG/L
	111, TRICHLOROETHANE	26	0	200. (D1) UG/L
	1,2 DICHLOROETHANE	26	0	5.0 (D1) UG/L
	CARBON TETRACHLORIDE	26	0	5.0 (D1) UG/L
	1,2 DICHLOROPROPANE	26	0	10.0 (G) UG/L
	TRICHLOROETHYLENE	26	0	5.0 (D1) UG/L
	112 TRICHLOROETHANE	26	0	.60 (D4) UG/L
	1122 T-CHLOROETHANE	26	0	0.17 (D4) UG/L
	CHLOROBENZENE	26	0	1510. (D3) UG/L
	1,4 DICHLOROBENZENE	26	0	75.0 (D1) UG/L
	1,3 DICHLOROBENZENE	26	0	130. (G) UG/L
	1,2 DICHLOROBENZENE	26	0	130. (G) UG/L
	TRIFLUOROCHLOROTOLUE	26	0	N/A UG/L

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedence,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario; currently 44 plants are being monitored. Water supply locations have been prioritized for surveillance, based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit. It is estimated that after 4 years of operation, the program will be monitoring 90 locations.

A major goal of the program is to collect valid water quality data, in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analysed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details, and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant, and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled.

Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". All laboratory analyses are carried out by the MOE Laboratory Services Branch.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP co-ordinator.

DWSP INPUTS AND OUTPUTS

The DWSP INPUTS and OUTPUTS are illustrated in Fig. 1.

PROGRAM INPUTS

PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and initial plant visit. During the initial assessment of the plant and distribution system the questionnaire content is verified and

missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components.

1. Process component inventory

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. Treatment chemicals

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. Process control measurements

Documentation of in-plant monitoring of process parameters (turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. In-plant monitoring results are generally not retained in DWSP but are retained by the Water Treatment Plant.

4. Design flow and retention time

The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow as well as a record of the flow rate on the day of sampling are recorded in DWSP.

5. Distribution system description

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. Sampling system

Each plant is assessed for its adequacy in terms of sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area;
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap), pump characteristics (model, type, capacity) and flow rate.

7. People

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

FIELD DATA

The second major input to DWSP is field data.

Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analysed according to standardized DWSP protocols to allow for interplant comparison.

LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data.

Samples gathered from the raw, treated and distribution sampling sites are analyzed for approximately 160 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments parameters may be measured for in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis however, those that are technically more difficult and/or costly to analyse for are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change notation will be made and intercomparison data documented.

PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information

This is a catalogue of information for each substance analysed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database.

An example is shown in fig. 2.

A written copy (hard version) of the Parameter Reference Information will be available in the near future and is a new and sophisticated enhancement to the DWSP.

PROGRAM OUTPUTS

There are four major program outputs, Query, Action Alert, Report Generation and the Annual Report.

QUERY

All DWSP information is easily accessed through the Query function, therefore anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the publication, Ontario Drinking Water Objectives (ISBN 0-7729-2725-1 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedences at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, other agency guidelines which are documented in the Parameter Reference Information may be used. If these guidelines are exceeded the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG. 1

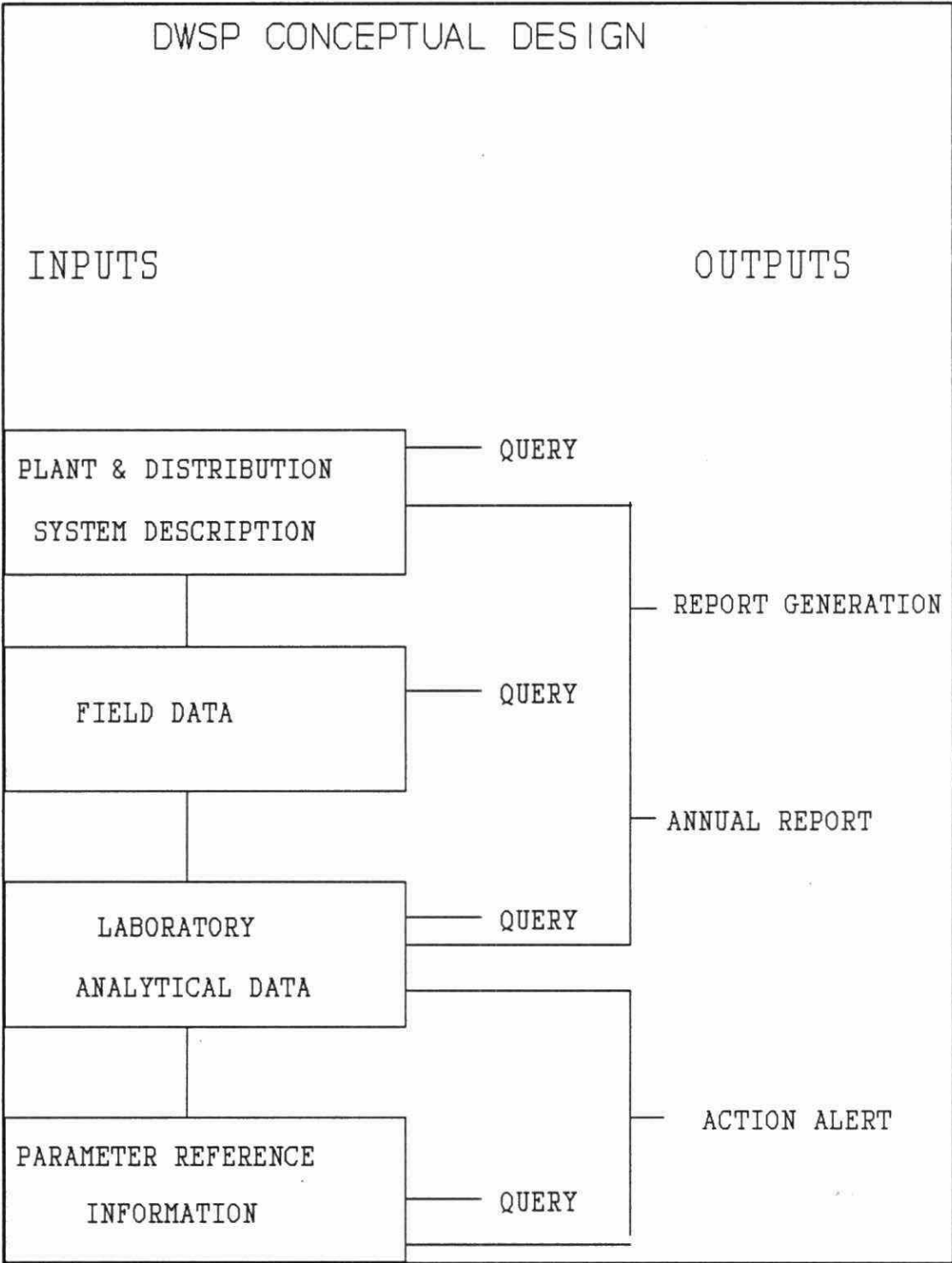


FIG.2

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

(B2001P)
REFERENCE
BENZENE

PARAMETER

SOURCE	FROM	TO	METHOD	TARG	UNIT	NOTE
EPA	C 86/04		NOMETH	.00	063000 UG/L	RMCL
EPAA	C 80/11		NOMETH	6.60	063000 UG/L	
FERC	C 84/05		NOMETH	1.00	063000 UG/L	
WHO	C 84/01		NOMETH	10.00	064000 UG/L	

DESCRIPTION: NAME: BENZENE

CAS#: 71432

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 UG/L

SYNONYMS: BENZOLE, COAL NAPHTHA, CARBON OIL (27),
CYCLOHEXATRIENE (41)CHARACTERISTICS: COLOURLESS TO LIGHT YELLOW, MOBILE,
NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE,
AROMATIC, VAPOURS BURN WITH SMOKING FLAME (30)

PROPERTIES:

SOLUBILITY IN WATER: 1780-1800 MG/L AT 25 DEG C (41)

THRESHOLD ODOUR: NO DATA

THRESHOLD TASTE: 0.5 MG/L IN WATER (39)

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING
ORGANISMS, APPEARS TO BIOACCUMULATE IN ANIMAL
TISSUES THAT EXHIBIT HIGH LIPID CONTENT OR ARE
MAJOR METABOLIC SITES (LIVER, BRAIN), SMALL
QUANTITIES EVAPORATE FROM SOIL OR DEGRADE QUICKLYSOURCES: PETROLEUM REFINING, SOLVENT RECOVERY, COAL
TAR DISTILLATION, FOOD PROCESSING, TANNING.USES: PREPERATION OF ETHYL BENZENE USED AS A STYRENE
MONOMER, DETERGENTS, NYLON, AS INTERMEDIATE INPESTICIDE PRODUCTION, SOLVENT IN RUBBER INDUSTRY,
DEGREASING AND CLEANSING AGENT, GASOLINE.TOXICITY: RATING 4 (VERY TOXIC); ACUTE - IRRITATES
MUCOUS MEMBRANES, SYMPTOMS INCLUDE RESTLESSNESS,
CONVULSIONS, DEPRESSION, RESPIRATORY FAILURE;

CHRONIC - ANEMIA AND LEUKEMIA (45).

CARINOGENICITY: HUMAN CARCINOGEN AND MUTAGEN

REMOVAL: GAC ADSORPTION, PRECIPITATION WITH ALUM
FOLLOWED BY SEDIMENTATION, COAGULATION AND
FLOCCULATION, SOLVENT EXTRACTION, OXIDATION (41).

MOLECULAR WEIGHT: 78.12 GRAMS

MELTING POINT: 5.5 DEGREES C (27)

BOILING POINT: 80.1 DEGREES C (27)

SPECIFIC GRAVITY: 0.879 AT 20 DEGREES C (27)

VAPOUR PRESSURE: 100 MM AT 26.1 DEGREES C

HENRY'S LAW CONSTANT: 0.00555 ATM M_2 /MOLE

LOG OCT./WATER PAR.COEFF:K=1.0 1/N=1.6 R=.97 PH=5.3

Appendix B

DWSP SAMPLING GUIDELINE

i) RAW and TREATED at PLANT

General Chemistry	<ul style="list-style-type: none">-500 mL clear plastic bottle-rinse bottle with sample three times and discard water-fill to line
Bacti	<ul style="list-style-type: none">-250 mL clear glass bottle with white seal on cap-do <u>not</u> rinse bottle; preservative has been added-avoid touching bottle neck or inside of cap-fill to top of red label as marked
Metals	<ul style="list-style-type: none">-500 mL clear plastic bottle with white lid-rinse bottle and cap three times, discard-fill to line-add 10 drops nitric acid (Caution: HNO_3 is corrosive)
Volatiles (OPOPUP)	<ul style="list-style-type: none">-250 mL clear glass bottle-do <u>not</u> rinse bottle-tilt bottle when filling-fill bottle completely; there should be no air bubbles.
Organic (OWOC), (OWTRI), (OAPAHX)	<ul style="list-style-type: none">-1 liter brown glass bottle per scan-do <u>not</u> rinse bottle-fill to approx. 1" from top-when 'special pesticides' are requested three extra bottles per sample must be submitted
Cyanide	<ul style="list-style-type: none">-500 mL clear plastic bottle-do <u>not</u> rinse bottle-fill to approx. 1" from top-add 10 drops sodium hydroxide (Caution: NaOH is corrosive)

Mercury

- 250 mL clear glass bottle
- rinse bottle and cap three times, discard then fill to top of label
- add 20 drops each nitric acid and potassium dichromate
- (Caution: HNO_3 and KCrO_7 corrosive)

Phenols

- 250 mL clear glass bottle
- do not rinse bottle
- fill to top of label as marked

Steps

1. Let cold water tap run for several minutes.
2. Record time in submission sheet.
3. Record teperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard -fill to line
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (Caution: HNO_3 is corrosive)

Steps:

1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	<ul style="list-style-type: none">-500 mL clear plastic bottle-rinse bottle with sample three times and discard water-fill to line
Bacti	<ul style="list-style-type: none">-250 mL clear glass bottle with white seal on cap-do <u>not</u> rinse bottle; preservative has been added-avoid touching bottle neck or inside of cap-fill to top of red label as marked
Metals	<ul style="list-style-type: none">-500 mL clear plastic bottle with white lid-rinse bottle and cap three times, discard-fill to line-add 10 drops nitric acid (Caution: HNO_3 is corrosive)
Volatiles (OPOPUP)	<ul style="list-style-type: none">-250 mL clear glass bottle-do <u>not</u> rinse bottle; preservative has been added-tilt bottle when filling-fill bottle completely; there should be no air bubbles
Organic (OWOC), (OWTRI)	<ul style="list-style-type: none">-1 liter brown glass bottle per scan-do <u>not</u> rinse bottle: preservative has been added-fill to approx. 1" from top
Cyanide	<ul style="list-style-type: none">-500 mL clear plastic bottle-do <u>not</u> rinse bottle: preservative has been added-fill to approx. 1" from top-add 10 drops sodium hydroxide (Caution: NaOH is corrosive)
Mercury	<ul style="list-style-type: none">-250 mL clear glass bottle-rinse bottle and cap three times, discard then fill to top of label-add 20 drops each nitric acid and potassium dichromate (Caution: HNO_3 and KCrO_7 corrosive)

Steps:

1. Record time on submission sheet.
2. Let cold water flow for ten minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

TD/434/C676/1988
Ontario. Ministry of the E
Cornwall Water Treatment
Plant. Annual report 1987
AUZY c. 1 ba Water